



# design for health & wellbeing

*SUMMIT 2017*



**ASU** Herberger Institute for  
**Design and the Arts**  
Arizona State University





# SUMMIT PRESENTERS

## Keynote:

*Dr. Mark Benden, Ph.D., CPE*

Department Head, Associate Professor, and Director of the Ergonomics Center at Texas A&M University; Cofounder, PositiveMotion, LLC and Stand2Learn

A professional ergonomist, educator, author, and entrepreneur, Dr. Benden has spent his career researching and developing ergonomic interventions and patented innovations that improve physical and mental wellbeing in classroom and office environments. He has long been a proponent of stand-based workstations that encourage movement and a cautionary voice regarding the health detriments of a sedentary lifestyle. In addition to his professorship role at Texas A&M, he is also director and head of the Environmental and Occupational Health department at the university's School of Public Health. He holds a BS in environmental engineering and an MS in industrial engineering.

## From Arizona State University:

*Steven Tepper:* Dean and Professor, Herberger Institute for Design and the Arts

*John Takamura:* Associate Professor of Industrial Design, Herberger Institute for Design and the Arts; Director of Design for GlobalResolve

*Milagros Zingoni:* Assistant Professor of Interior Design

# OVERVIEW



On the evening of March 15, 2017, a group of 100+ academics and design-industry professionals convened in Tempe, Arizona, for an open discussion about how the workplace—and, by extension, all spaces—can be designed to foster health and wellbeing. The summit was the culmination of a two-phase year long study that an interdisciplinary group of ASU graduate students conducted at the headquarters of bicycle manufacturer *Pivot Cycles*. Students shadowed and documented company employees, observing and measuring habits and variables such as break-taking frequency—both before and after the office was equipped with products from *ESI Ergonomic Solutions*. Those products included

sit-to-stand desks, adjustable monitor arms, keyboard holders, and other elements designed to promote movement and sound ergonomics.

The goal of the study was to ascertain whether the design interventions enhanced employee wellbeing and productivity, and reduced pain—and there were demonstrable improvements on all fronts. Although the study focused on just 21 employees at a single company—one that happens to have a focus on health and exercise—the findings aligned with other, larger studies on the topic. The many proven benefits of an activity-permissive, user-empowering environment have broader implications: for schools, wellness spaces, surgical theaters, and other workplaces—and for



public health. “The majority of diseases that kill us are preventable lifestyle diseases,” said Dr. Benden. “If we want to alter the cost of healthcare, we need to shift the focus from sick care to preventative care.”

The event was an opportunity for students to present their research findings to community members vested in design for wellbeing: architects and interior designers specializing in the workplace and healthcare sectors, engineers, product designers, academics from various disciplines, and local residents. The summit format was intended to maximize audience participation; attendees were encouraged to ask questions during the two-hour presentation and offer insights about their own work environments and experiences.

The interaction and cross-dialogue that resulted reflects *Herberger Institute for Design and the Arts*’ aspiration to build a world-class interdisciplinary research program that’s firmly integrated with and shaped by community partners. “The university sees its role as pivotal to the cultural, economical, and physical health of our community,” said one attendee. “We need to harness the imagination, methodologies, and talents of artists and designers to take on some of the world’s most pressing problems”—including the health of our people and our planet. It was a poignant reminder for students and practitioners alike about the importance and impact of their work, and how the most inspired and effective solutions arise from cross-disciplinary collaboration.

## THE BENEFITS OF AN ACTIVE WORK ENVIRONMENT

### To contextualize the ESI/Pivot Cycles study,

Dr. Benden shared insights on sedentary behavior research. "Humans are dynamic creatures, with bodies designed for change," he explained. "We experience negative health effects from spending too much time in one position."

On the flip side, simply standing up from a seated position kicks off a host of physiological and biochemical changes. Among them:

- lowered blood pressure
- increased heart rate
- tenfold increase in lipoprotein (i.e. LPLs), which metabolize the "bad" fat in our bloodstreams
- reduction in stress
- dispersal of blood that pools in the lower legs (and that can cause varicose veins)
- increased blood flow to the brain

In addition to benefiting one's health, changing positions also improves focus and helps us stay on task. Activity-permissive work environments spark cognition jumps in the 5-10% range. (In comparison, consuming one Sudafed increases cognitive ability by .05%; chewing gum offers a 1-3% boost.) "We think better on our feet than in our seat," said Dr. Benden. "But only for a bit: If we stay flatfooted, that effect will diminish." Movement, not simply standing, is the ultimate goal.

Increased activity equals increased cognition, which in turn ramps up productivity—a metric that translates to increased profit. One study of a 750-person corporation concluded that converting all employee workstations to sit-to-stand desks correlated to a \$2-5 million ROI. Such large gains make stand-permissible elements a wise investment. "If we want CEOs to adopt features that are healthy for their workers, we need to speak their language," said Dr. Benden.

Some 60% of U.S. workers now utilize sit-to-stand workstations, noted Dr. Benden. Far from simply exchanging static seating for static standing, "we find that people who change position end up adding 2,000 steps a day. That's a lot of extra movement."

*"Humans are dynamic creatures, with bodies designed for change. We experience negative health effects from spending too much time in one position."*

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range

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## Related research has shown that:

- ***“Work” is increasingly sedentary:*** One study found that office workers spend about 1.5 hours a day typing or tethered to the computer mouse. Combined laptop, tablet, and desktop use for college students was 1.8-2.2 hours, coupled with 4 hours of smartphone use—which adds up to 5-6 hours of screen time during which physical movement is limited.
- ***The more that workers stand, the more they move:*** Workers with height-adjustable desks use the feature to an increasing degree over time. Another study revealed that these workers spend two fewer hours seated per day. After six months in a stand-biased environment, workers ambulated more than five extra miles per week.
- ***But there’s a cap:*** “These interventions are not making workers go from sitting to standing all day: at most they’re standing 20-30% of their day.” But, he added, even that seemingly modest amount correlates to statistically significant cognitive improvements.
- ***There’s not enough science yet to assess long-term gains.*** “A challenge we have in changing human behavior is that people tend to default back to what they’re accustomed to,” and we’re used to sitting most working hours, said Dr. Benden. Whether these interventions can reduce sedentary behavior for the long term remains to be seen, as most studies are too new.



These findings have broader public-health implications. "We are currently witnessing the largest change in human proportions in history," said Dr. Benden. "Combating the obesity pandemic is going to require multiple solutions." One promising strategy is to introduce standing-height desks in classrooms, which in one study translated to 2-3,000 extra steps per school day. A two-year analysis of stand-capable classrooms also correlated to a statistically significant 5% BMI reduction in elementary schoolers. "If we can alter the trajectory of growth for kids who are starting to struggle with obesity, we can increase their life expectancy and lower their lifetime healthcare costs," said Dr. Benden.

We can also potentially keep more kids off Ritalin. Students in stand-biased environments enjoyed cognition gains of 5-7%. Benefitting the most were ADHD sufferers, who are "wired" to move. "When all kids stood up, we found no statistically significant difference between how both groups performed academically—unlike when everyone was seated," Dr. Benden explained.

## Behavioral Interventions/ Computer Prompts

The best stimulus to encourage workers to take full advantage of height-adjustable desks? "Training," said Dr. Benden. "You can't sneak in these features. It's critical that an employee understands what it's for, how to use it."

But another extrinsic motivator that may yield better results: "intelligent" prompts that are tailored to a user's preferences. Some people prefer a gentle nudge to get up and move, whereas others respond better to a more drill-sergeant-like approach. "Technology caused the

problem of sedentariness, but it can also be harnessed to provide a solution," said Dr. Benden. Gamification is another tool that shows particular promise, he added. "We're currently testing dashboards and competition as motivators. From exercise research, we know enough about what techniques work and which are sustainable."

One summit attendee cautioned employers to be careful about how they couch these prompts, which some staffers may welcome, but others may be skeptical of. "If an employee thought you were creating a strategy to get more productivity out of them, they might feel exploited," he said. "They already think they work hard enough! The message to employees should be that the ROI is their health. Not the company's bottom line."



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# PIVOT CYCLE CASE STUDY

Sponsored by *ESI*, the *Pivot Cycles* study was a cross-disciplinary research project to impart workplace health and wellbeing through design. A team of graduate students from the College of Industrial Design shadowed and observed (both in person and virtually, via cameras) 21 *Pivot Cycles* employees. They also conducted interviews about their work habits and preferences, such as water consumption and whether they liked working in a bright or dim room. Students also collected anthropometric data on the employees' statures.

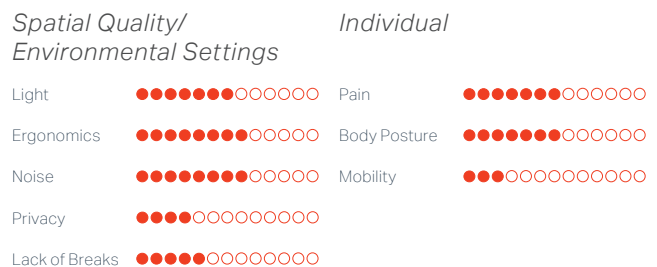
To paint a more thorough picture of the workspace, the research team noted details about environmental and spatial qualities throughout the office, including degree of privacy, levels of noise and artificial illumination at different times of the day, and access to natural light. The study focused specifically on the engineering room, sales department, accounting room, and workstations of employees with a private office versus others in a communal setting with open cubicles.

## Before

Key observations the students made during the initial information-gathering phase:

- Despite their broad variance in stature, from 5'1" to 6'2", all 21 employees' desks were fixed at the same height of 29".
- The only aspect of the workspace most employees could control was their seats. And, to a lesser extent, their task lighting. "There was a huge difference between offices—some light some dark," explained Professor Milagros Zingoni. "It depended on whether they had windows in their workspace, and on their personal habits. Data shows that access to light makes us more efficient, but you also have to account for personal preference."
- Employees typically stayed seated for long periods of time—even though most were highly active outside the office, some biking for up to an hour a day—and not at a proper posture: Keyboards were placed at desk height, rather than just below, and some staffers worked on multiple side-by-side screens improperly positioned in a manner that invited neck strain.
- Due to extended time spent seated with subpar ergonomics, employees experienced different levels of physical pain in their necks, shoulders, backs, and eyes.
- Half of the employees took infrequent breaks and didn't hydrate adequately.
- There was a broad variance in noise levels from department to department. The engineering room was quiet versus the typically noisy sales department.

### Common Problems (13 people surveyed)



## The Intervention

In order to conduct a sound study that would demonstrate the connection between design and wellbeing, the students needed to concentrate on a variable that could be easily isolated and controlled. Tackling lighting and noise levels proved too complicated, but changing the furniture was an easy and effective switch. The students worked with *ESI* to specify products that were tailored to the statures and work styles of each employee. Installation of furniture and monitors was customized to five points: standing, seat, eye, and seat-pad height as well as seat-pad depth. For instance, monitor arms were calibrated to position the computer screen at proper viewing height to mitigate neck strain.

## Ergonomics Data Analysis

**Testing Number:** 21 employees

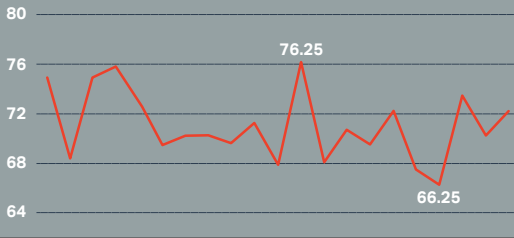
**Pie charts** shows the distribution data in different proportion of range

**Line charts** shows the maximum and minimum data distribution as well as the average.

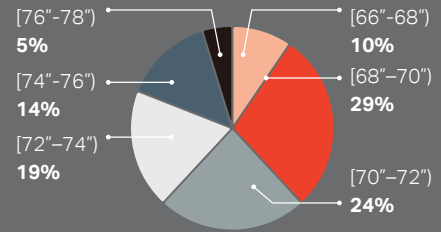


### A. Standing Height (inches)

Average standing height: 71.073 inches



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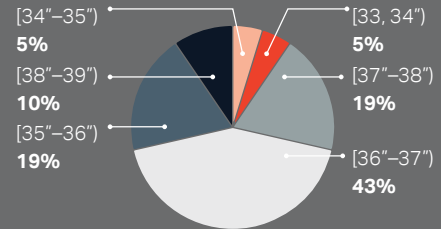


### B. Sitting Height (inches)

Average sitting height: 36.3 inches

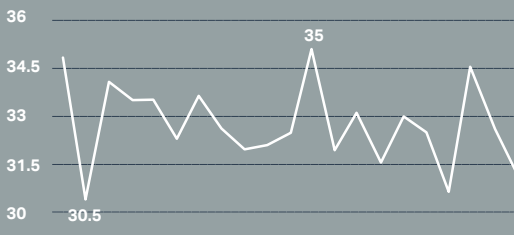


### B. Sitting Height

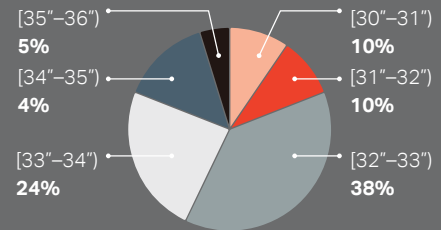


### C. Eye Height (inches)

Average eye height: 32.75 inches

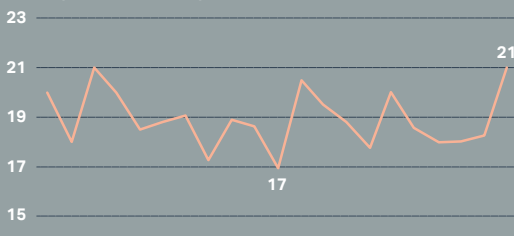


### C. Eye Height

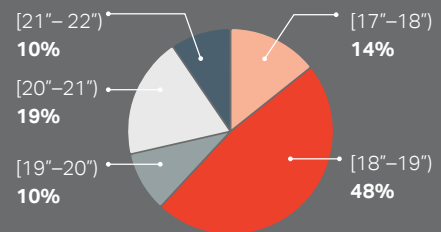


### D. Seat Pan Height (inches)

Average seat pan height: 18.92 inches

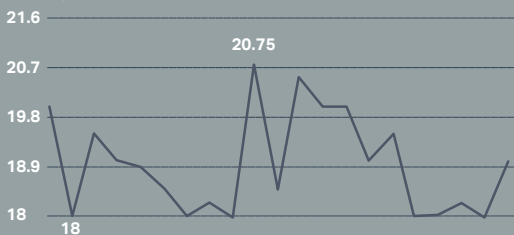


### D. Seat Pan Height

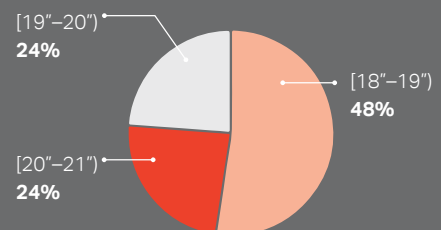


### E. Seat Pan Depth (inches)

Average seat pan depth: 18.93 inches



### E. Seat Pan Depth



# Sitting Before and After

From "Sit" to "Sit & Stand"

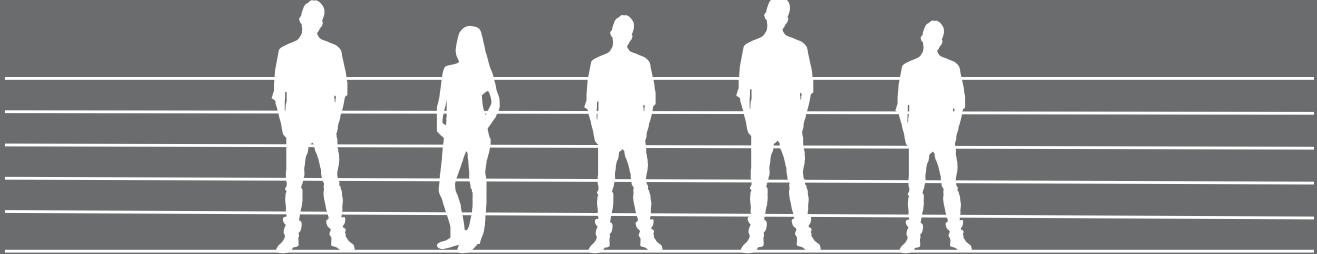
Bryan

Mary

Brien

Ryan

Aaron



**PHASE 1**  
Seated  
Desk Height



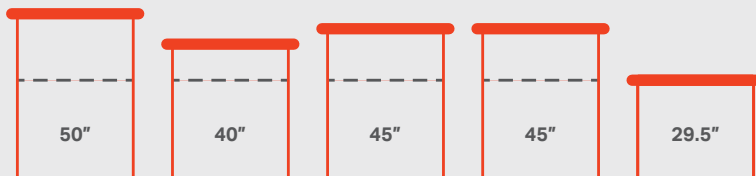
29.5" Standard  
Fixed Height Tables

**PHASE 2**  
Seated  
Desk Height



Adjustable  
Height Tables

**PHASE 3**  
Standing  
Desk Height



Adjustable  
Height Tables

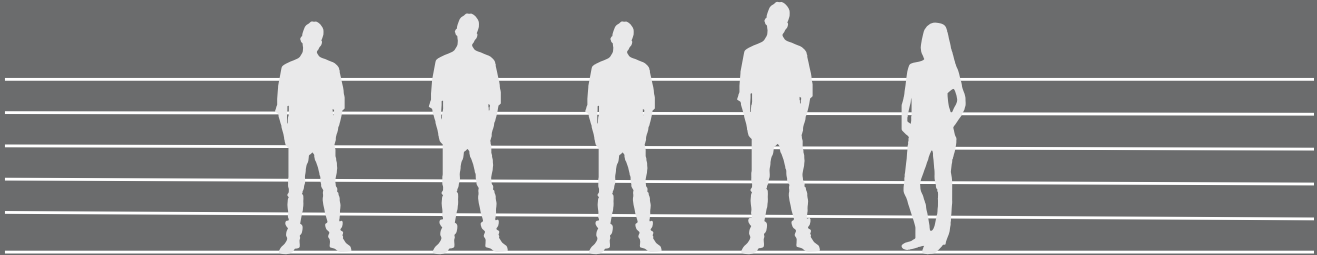
Dan

Ian

Erik

Zach

Jaclyn



**PHASE 1**  
Seated  
Desk Height



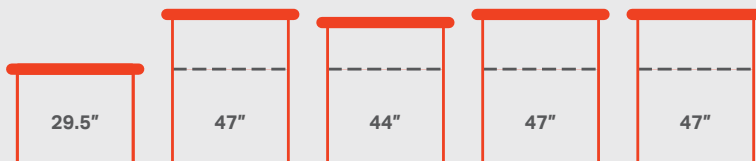
29.5" Standard  
Fixed Height Tables

**PHASE 2**  
Seated  
Desk Height



Adjustable  
Height Tables

**PHASE 3**  
Standing  
Desk Height



Adjustable  
Height Tables

## After

Five weeks after installation, the students returned to conduct the same set of observations and metrics as before. Their findings concluded that:

- Employees had improved posture when seated (namely, they sat straighter).
- They took advantage of their desks' sit-to-stand capabilities, changing the height for different daily functions. Interestingly, they tended to stand more in the morning and sit more after lunch.
- Employees had the impression that height-adjustable products could improve their productivity. One believed his productivity jumped from "a 2 to a 8 on a 1-to-10 scale".
- Many health issues were resolved: Employees experienced less upper back pain and greater workstation satisfaction.
- A new issue arose, however: foot aches from prolonged standing. To counteract that, one employee utilized an anti-fatigue mat.

## Conclusion & Follow-up

At the culmination of the study, most employees were very pleased with their new workspaces and felt productive by objective measures, but others were still getting used to the modifications. Students concluded that it was too soon to make any pronouncements either way about boosts to wellbeing.

However, *Pivot Cycles* cofounder and CFO Cindy Cocalis attended the summit, and shared her own perspective, having had eight months to use and adjust to the modifications. "It's amazing how many people are moving their desks and fully utilizing the enhancements we put in, and how much they continue to use and value them," she offered.

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*"It's amazing how many people are moving their desks and fully utilizing the enhancements we put in, and how much they continue to use and value them."*

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## CREATING AN ACTIVITY-CONDUCTIVE ENVIRONMENT

Given the many advantages to employee health and a company's bottom line, company leaders have an opportunity and an imperative to envision spaces that promote activity and facilitate health. In addition to products like height-adjustable desks, there are other features that a workspace can incorporate to get employees moving:

- **Well-placed hydration stations.** "And give staffers small, 8-ounce cups to encourage them to go back for frequent refills," said Professor Milagros Zingoni.
- **Standing-height meetings:** Convert all conference tables to sit-to-stand which encourages more standing, and makes meetings faster and more productive.
- **Encourage (and be tolerant of) the "hallway meeting,"** cited by many summit attendees as the height of efficiency and productivity, but sometimes frowned upon by management as time wasting.
- **Incorporate different table heights** in the employee lunchroom/café to give employees a choice of whether they sit or stand to eat their lunch.
- **Design for a little discomfort:** "You are less productive when you are too comfortable," said Dr. Benden. "Maybe it's less about designing the perfect chair and more about allowing users to have control over their environment."



## THE BIGGER PICTURE

Countless studies of activity-permissive environments attest to the physical, mental, and organizational benefits of such spaces. The *Pivot Cycles* research reinforces this message and demonstrates how grateful workers are for having more control of their environment.

Yet these measures are not as ubiquitous in the contemporary office as they should be. Some reasons cited:

- A lack of buy-in from leadership. “You have to make the case that design is good for business, and will solve wicked problems,” said Dr. Benden.
- Change management complications. “Sometimes it’s easier to change individual behavior than organizational behavior,” one attendee noted.
- The inaccurate perception that if an employee is not sitting in their desk, they’re not getting work done or being productive.
- The “we’re OK” syndrome. Often, people aren’t aware of their discomfort in the workplace until after their space has been improved. “You don’t know what you needed until you get it,” offered Dr. Benden. The students observed this in the *Pivot Cycles* study: one staff member was particularly challenging to interview, since she couldn’t quite earmark what she didn’t like about her current environment. “It was only after the modifications were implemented that she realized—and could articulate—what had been missing,” a student explained.
- We have a higher tolerance for sedentariness in the office, and that entrenched bias may be hard to overcome—even by otherwise active individuals.
- Lack of education about what “sedentary” really means. Dr. Benden cited the phenomenon of the “exercising couch potato”: those who hit the gym three times a week for 30 minutes—but are sedentary the rest of the time. “In that 90 minutes of gym going, you can’t overcome all of the damages you’ve done by sitting the rest of the time.”

**The study also begged a bigger question:** How to encourage more schools and workplaces to adopt these wellbeing-boosting measures, and how to more effectively spread the word about the grave dangers of a sedentary lifestyle. “Moving away from the workplace, how can we apply this to our lives? How can we be more productive and mindful?” wondered Dr. Benden. “You can read as many articles as you want about what’s good for you, but ultimately you have to take ownership of your own health. How can we begin moving in that direction?” By reinventing how we educate, manage, and collaborate.

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*Dr. Benden had a word of advice for the audience:*

**“Think hard about whether your company represents the change you want to be.”**

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**E:** [info@esiergo.com](mailto:info@esiergo.com)

**[esiergo.com](http://esiergo.com)**

